The Refrigeration Service Engineer

Vol. 1
No. 2

JULY • 1933

Commercial Servicing—Electric Motors—
Beer Coolers—Service Inspection Agreement—
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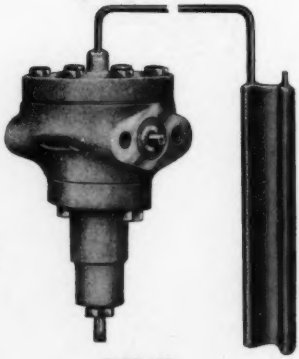

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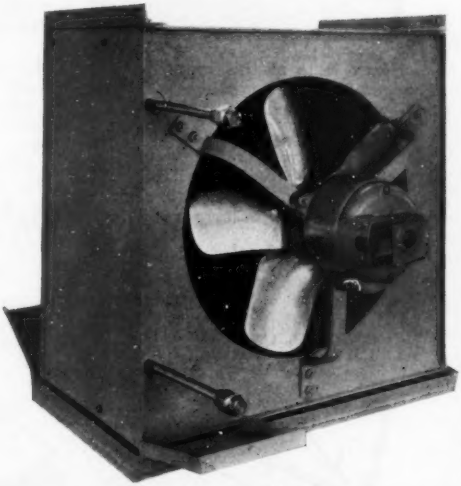

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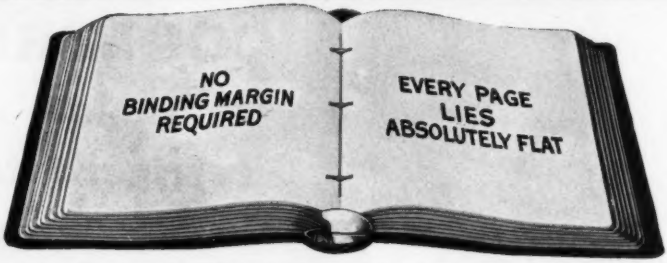

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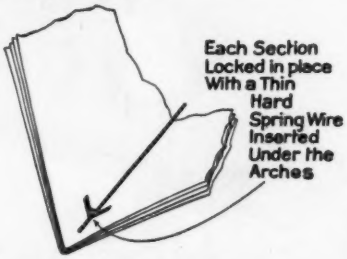

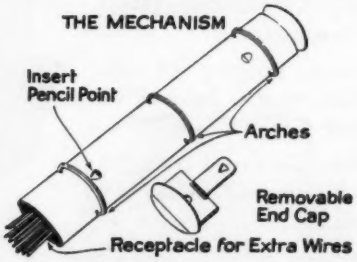

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The REFRIGERATION SERVICE ENGINEER

Devoted to the Servicing of
REFRIGERATION UNITS *and* OIL BURNERS

VOL. I | JULY, 1933 | NO. 2

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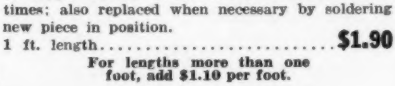

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The Refrigeration Service Engineer

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

OFFICIAL ORGAN REFRIGERATION SERVICE ENGINEERS' SOCIETY

VOL. 1, NO. 2 CHICAGO, JULY, 1933 $2.00 Per Annum

Service Inspection Agreement

An Ounce of Prevention Is Worth a Pound of Cure. Service Inspections by Competent Service Engineers Will Prevent Many Costly Replacements. This Article Suggests the Development of a Service Inspection Agreement.

By HERBERT HERKIMER

USERS of electric refrigeration, as time goes by, begin to realize that the nominal cost of the refrigerating equipment is not the ultimate cost. A few cents or a few dollars saved in the purchase of one part may be spent many times over in keeping that part in operating condition. On the other hand, a quality part may pay for itself several times over by eliminating expensive servicing.

Surveys have shown that the simplest service call costs a dealer, with high rent and overhead, at least $5.00. The independent service man with a small shop, will find that the simplest call will cost at least $2.50.

It is not an exaggeration to say that the majority of refrigerating equipment manufactured today is of the highest grade and is giving satisfaction to the user.

However, present day methods of maintenance are unbusiness-like and expensive and it is usually the fault of the user.

Does the customer show common sense by waiting for a piece of machinery to break down? To avoid possible trouble that slowly develops in the course of business, institutions give regular inspections to equipment, such as banks, ships, railroads, elevators, aeroplanes, etc. Why should not the electric refrigerator be given a regular inspection?

How many landlords and owners of electric refrigerators call up service men to look over the refrigerating equipment, and make a report on its operating condition? That type of owner is an exception and not the rule. The usual custom is to wait until the refrigerating unit breaks down and then condemn the unit, before calling up a service man.

To eliminate expensive servicing the user of electric refrigeration should employ an expert to make a regular inspection of the refrigerating unit. The independent service man will find this branch of work a new source of income.

However, the idea must be sold and a good salesman is required to convince the average user of the intangible benefits of entering into a service inspection agreement.

The average charge for inspection of a butcher shop would be about $5.00. If a brine circulating system, about $1.50 should be added. The inspection of a small domes-

tic unit in an apartment building should be sold for $1.00 per unit per inspection provided there are at least twelve units in the building. If there are less than twelve units in the building, the charge should be $1.50 per unit for inspection. To inspect an individual unit in a private house cannot be done for less than $2.50 per call and show a profit to the service man.

Next month we will show a form of agreement which will set forth the obligations of the service man and the terms on which it is proposed to do the inspection work, as well as the price and terms of payment. The writer would appreciate securing suggestions from readers as to the wording of this agreement, it being proposed to utilize good ideas that may be sent in. Those who already have such agreements in force are invited to send copy of same, it being thought that it may be possible to propose a form of agreement that might become standard. Address all communications to the Editor of this magazine.

The Design and Construction of the Temprite Beer and Liquid Cooler

Practical Service Pointers on the Temprite Cooler. A Description of its Operation. Essential Features of Proper Cooling of Liquids. Setting of Control Valves

By D. H. DOLISON
Sales Manager, Liquid Cooler Corp'n.

UNTIL approximately five years ago, the development along the lines of water and beverage coolers for electric refrigeration was sadly neglected, and the old double coil indirect type water bath system originally designed had never been improved upon. Mr. H. C. Kellogg and associates, along about 1926-1927, started developments in electric beverage and water coolers, and after considerable time, the present model of Temprite was evolved.

Essential Features of Proper Cooling

There are several important features necessary to the proper cooling of liquids. One is automatic and definitely accurate control of the exit water, beverage or beer. This is accomplished by obtaining maximum efficiency through the immersion of the beverage or water coil directly in the body of refrigerant. This principle, of course, forces the beverage and water to travel through a coil and does not permit any of the liquid to be cooled to short circuit from the inlet to the outlet of the coolers as in the storage type. The coils, in each case, were designed just sufficiently long, with slight surplus in length, to remove the heat from the liquid to be cooled from the incoming temperature, regardless of what that might be, to the exit temperature desired. The length of tube can be definitely determined.

Since the means of forcing the liquid through the body of refrigerant in a definite path had been found, it was then necessary to definitely control the temperature of the body of liquid refrigerant so that the exit beer or water would always be maintained uniformly at the pre-determined temperature. Since the pressure and temperature of refrigerant go hand in hand and are inseparable, the present Temprite temperature control valve was developed. This is simply an automatic valve which maintains the pressure of the refrigerant vapor in the cooler always at the pre-determined point.

Open Type Float

In order to build the cooler of a small size and still operate perfectly to obtain liquid refrigerant level control and return of lubricant, it was necessary to develop a new

float and the present open type float used by the Fedders Manufacturing Company and the Liquid Cooler Corporation exclusively was the result of this development. Temprite coolers are all of the instantaneous type equipped with the open bucket type floats and automatic pressure maintaining valves. These features result in almost perfect maintenance of the temperature of the exit beverage regardless of the incoming temperature within the capacity of the compressor or cooler to carry away the gas.

in the cooler reduced to the proper point to obtain that for which the control valve was set. The cut out pressure of the control valve should be from zero to 4 inches vacuum in the case of sulphur dioxide, while in the case of methyl chloride, the compressor should be set to cut in at approximately 25 pounds and out at approximately 4 to 5 pounds pressure.

Temprites are made for use with methyl chloride and sulphur dioxide, but they are not interchangeable.

CROSS SECTION OF THE TEMPRITE COOLER

Setting of Control Valves

The temperature control valves for beer and other beverages are set for approximately 9 pounds pressure which will maintain the exit beverage or beer at 37 to 38 degrees with a very close tolerance. It is necessary for the control on the compressor to be of the pressure type and to be set to cut in at a pound or two lower than the setting of the control valve, otherwise warm beer or beverage will result because the gas is not being carried away, and the pressure

Service Pointers

When warm beer, beverage or water is reported as being the trouble on Temprite installations, there are several troubles to look for.

First: Insufficient refrigerant, which lack of refrigerant may be determined by placing the ear close to the cooler and observing a distinct hissing noise, which is gas passing through the float valve orifice inside the Temprite cooler and due to the fact that there is no seal between the high and the low

side in the Temprite cooler, the compressor will be inclined to operate continuously with a tendency to equalize high and low side pressures.

Second: Either the compressor or the Temprite cooler may be too small. This, of course, can be determined by checking the amount of beer, beverage or water drawn, with the rated capacities of the Temprite cooler and compressor.

Third: The cooler may be located too far from the point of use or the beverage, water or beer lines from the cooler to the faucets exposed to high room temperatures.

Fourth: Float valve or screen clogged with dirt. This condition, of course, does not permit liquid to flow sufficiently fast into the Temprite cooler to obtain the exit temperature desired, and, in some cases, does not permit any to flow into the cooler with the resultant high exit beverage, water or beer temperatures. The remedy for this is to unscrew the float valve in the top center of the cooler, first pumping out the charge of refrigerant, and after removing the float valve, unscrew the cap on the bottom of the float valve, remove the screen and needle assembly, take out the dirt and replace.

Fifth: A sulphur dioxide cooler charged with methyl chloride or vice versa.

Sixth: Compressor cutting out from high head pressure due to over-charge of refrigerant, air in the system or plugged liquid lines. These may be remedied in the usual manner.

Seventh: Leaky control valve. This condition rarely occurs and when it does, a low temperature will be maintained in the cooler corresponding to the setting of the compressor, and in some cases may actually freeze the beer or water in the coil. Freezing of the water or beer in the Temprite coil will cause no damage whatsoever unless the freezing is repeated for an indefinite number of times.

Eighth: Leaky float valve. This will cause excessive short cycling of the compressor and usually frosting back of the suction line some distance from the cooler, and in some cases all the way back and on the crank case.

Ninth: Liquid and suction shut-off valve attached to the cooler not open. This is readily remedied in the usual manner.

Tenth: In some instances where beer is being cooled, it will be noted that it is very foamy at the glass, which is known as "wild" beer. This condition is caused by either the beer in the keg being too warm or the keg being rolled around, placed in position and not permitted to settle properly, or both. If the beer continues to be "wild" after settling for 24 hours, it will be noted that the CO_2 pressure on the keg of beer is usually too high which will cause excessive foam. This condition may be remedied by bleeding the keg of the excess gas to the point where beer can be properly drawn into the glass. The bleeding should be done at the packing nut on the tap rod so that no beer will be lost in the operation. "Wild" beer will sometimes cause high exit temperatures due to the fact that the beer is not in solid liquid form but consists of a large percentage of CO_2 gas bubbles with the consequent lack of surface to cool the given quantity of beer per hour.

MOVING REFRIGERATORS

IN moving or sliding cabinets, particularly the larger and heavier sizes, over linoleum or bare wood floors, there is considerable likelihood of marring the linoleum or floor. Oftentimes rollers and dollies are inadequate and they too may have a tendency to cause a condition which every precaution should be taken to prevent. According to the Westinghouse Service Department, a simple solution of this problem is described as follows:

"A piece of coarse felt three-quarters to an inch in thickness may be cut ten to twelve inches square and cemented with good glue or its equivalent to a piece of sole leather or quarter-inch rubber of equal size. With these four pads, the refrigerator cabinet may be placed on the linoleum or wood kitchen floor with a pad, felt side to the floor, under each leg without danger of tearing or rolling up whatever kind of linoleum is used or scratching the most highly polished floor. Try it, if you have had trouble in moving cabinets in homes. Those who have used the idea are sold."

Capacitor Motors for Refrigerators

Description of Westinghouse Capacitor Motors. Speed Torque Characteristics. Switching Mechanisms Required. Self-Protecting Thermostat Which Protects Motors from Burning Out.

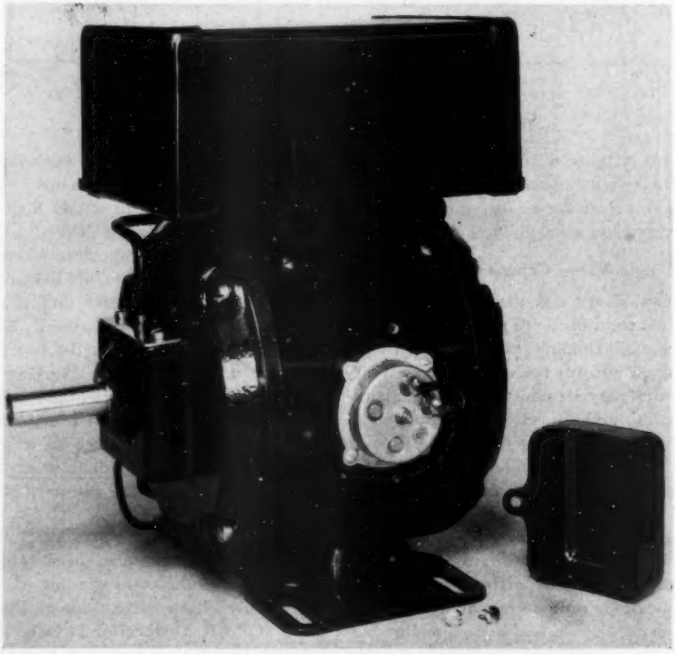
By R. EHRENFELD,
Manager Small Motor Engineering Department
Westinghouse Electric & Manufacturing Company

THERE are three varieties of this type of motor which is the latest type to be produced commercially. These three types are:

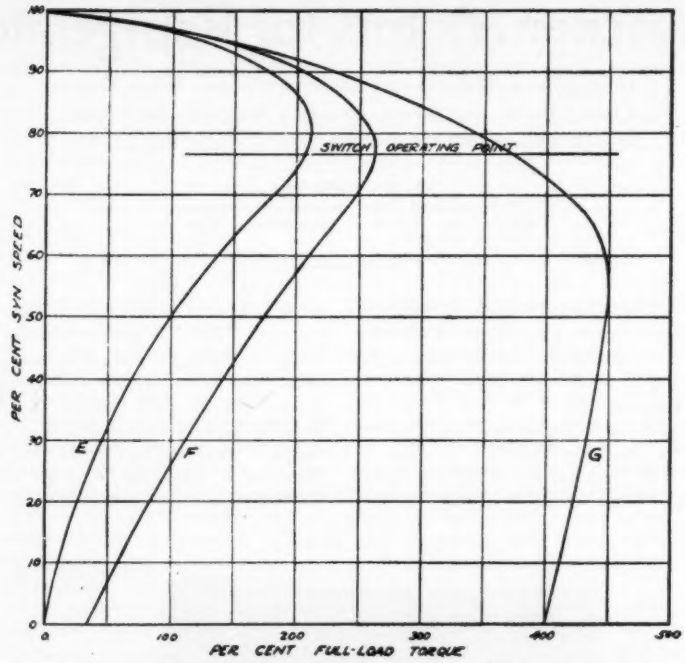
1. Capacitor Start.
2. Single Value Capacitor.
3. Two Value Capacitor.

In all of these motors there is a main winding and an auxiliary winding on the stator. All of the rotors are of the squirrel cage type. In each case a capacitor is connected in series with the auxiliary winding either directly or through a transformer.

The capacitor start motor is the same as the split phase motor except that a different design of auxiliary winding is used and the capacitor is connected in series with this winding as has just been indicated. When



WESTINGHOUSE CAPACITOR MOTOR



CAPACITOR MOTOR SPEED TORQUE CURVES

the motor attains a predetermined speed, the auxiliary winding is opened and the motor operates the same as the split phase motor or repulsion start induction motor.

Single Value Capacitor Motor

If the windings and the capacitor of the motor just mentioned are so proportioned as to give good running performance if the auxiliary circuit was not opened, the centrifugal switch may be omitted and the auxiliary winding and capacitor be permitted to remain connected to the line. This type of motor is known as single value capacitor motor. It is not possible to produce a motor and capacitor design such as to give high starting torque and good running performance without changing the connections to the motor or to the capacitor. In such motor applications as blowers mounted directly on the shaft, the single value capacitor motor is quite satisfactory. Sufficient starting torque can easily be obtained with an auxiliary winding design and capacitor which gives good running performance.

If it is necessary to obtain high starting torque and it is, also, desired to operate the motor with the capacitor winding energized, it is necessary to start the motor using one value of capacitance and change this value at a predetermined speed. This is the motor which is known as the two value capacitor motor. It has starting torques comparable with the starting torque of repulsion start induction motors, but during normal running is similar to a polyphase motor due to the fact that power is being supplied to both of the stator windings.

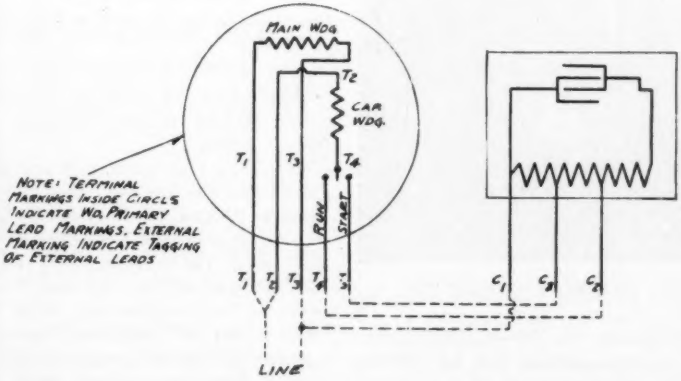
Speed Torque Characteristics

Curve "E" shows the speed torque characteristics of the main winding of a capacitor motor. This is the same as Curves "A" and "C." If a capacitor is to be used only during the starting period it, with the auxiliary winding, can be so designed as to give

the Curve "G." When the speed of the motor has reached the point where the switch which operates the auxiliary winding is opened the motor then operates on the upper portion of Curve "E." In these cases where lower starting torque is satisfactory, the single value capacitor motor is used, which has a speed torque curve such as "F." If a two value capacitor motor is used, it has a speed torque curve which is a combination of Curves "F" and "G." For the starting period the value of capacitance is the same as for the capacitor start motor, and the speed torque curve is the lower portion of Curve "G." When the switch operates instead of opening the auxiliary circuit, it transfers the connections so as to reduce the capacitance of the capacitor to the proper value for the running condition and the motor continues to run under normal operation in accordance with the upper portion of Curve "F."

Centrifugal Devices

In the motors just described various switching mechanisms are required. It is extremely essential that this mechanism be capable of operating a large number of times and that their operation be positive. This latter requirement is particularly true in the case of a two value capacitor motor. If the switch hesitates between the two connections, the capacitor winding is completely disconnected from the line, and the torque of the motor is materially reduced. This may result in a slowing down of the motor and result in the switch returning to the starting position instead of completing its operation and making the running connection. The proper transfer of connections can be obtained only when this switching operation is performed quickly and positively with an action similar to that of a quick make and break switch.



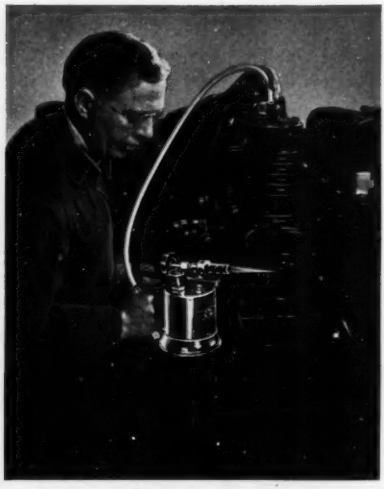
MOTOR & LINE CONNECTIONS FOR C.C.W. ROTATION

LINE CONNECTIONS FOR C.W. ROTATION

WIRING DIAGRAM FOR WESTINGHOUSE CAPACITOR MOTOR

HALIDE LEAK DETECTOR

THE Turner Brass Works of Sycamore, Illinois, well-known manufacturers of blow torches for more than 60 years, have successfully introduced a new product to the refrigeration industry known as the Turner Halide Refrigerant Leak Detector. According to the manufacturers' statement their device will detect leakage of any chlorinated hydrocarbon, including such refrigerants as Artic, Methyl Chloride, Ethyl Chloride, F-12, F-114, Freon, Carrene, Methylene Chloride, Trichlore-Ethylene, and Dichlorodifluomethane.



THE HALIDE LEAK DETECTOR

Fundamentally the Turner Halide Detector is an alcohol burning blow torch having a hollow chamber around the base of the burner connecting with a flexible rubber tube through which the air supply is drawn. The alcohol flame is normally pale blue, but if the open end of the syphoning tube is held in proximity to a leaky joint the refrigerant gas is drawn into it and on striking the burner a copper chloride is formed and the flame color changes to a bright green.

This device is extremely sensitive and refrigerant leaks equivalent to a loss of one pound of gas in 7½ years have been detected easily under special tests. The flexible rubber tube permits testing otherwise inaccessible joints which could not be reached by other methods, also it will locate leaks too small to be found by an ordinary soap and water test, as with the latter method bubbles may not form rapidly enough to be seen readily or the point of leakage may be concealed from vision.

If desired, users of Halide Detectors may secure an accessory device known as a Sleeve Adapter which slips over the end of the burner tube and forms a sharp pencil pointed flame which is excellent for fine soldering jobs.

The Turner Halide Detector has been approved by all leading manufacturers for laboratory, production, or field service purposes and thousands are in use by installers everywhere. It has proved to be an indispensable tool for service men who wish to be definite in their diagnosis of complaint jobs and equally certain that needed repairs have been correctly made.

S S S

THE QUESTION BOX

A VALUABLE feature, which will hereafter appear in future issues of THE REFRIGERATION SERVICE ENGINEER, is the Question Box.

Readers are invited to send any problems with which they are confronted on servicing work to the Question Box, which will be answered by competent authorities in succeeding issues. The Question Box is now an important part of the educational work of some of the local chapters of the Refrigeration Service Engineers' Society, and through this medium, members secure practical assistance on problems which they experience in the installation and servicing of household and small refrigerating equipment or oil burners.

On another page of this issue will be found an answer to a question from the Question Box of the Chicago Chapter on "How to Charge a Holmes Refrigerator."

This new department is for the service of each subscriber, and you are invited to send any questions on refrigeration servicing to the Question Box.

SERVICE POINTERS

Readers are invited to send descriptions of "kinks" which they have found to be of practical help in their every day work. Just send your idea or sketch in the rough, which will be prepared for publication. All contributors' names will be printed. Address the "Kinks" Editor, REFRIGERATION SERVICE ENGINEER, 433 N. Waller Ave., Chicago.

High Pressure Floats

A service man receiving a call to service the old Servel High Pressure Methyl Chloride Float System should not condemn this system just because he is ignorant of its merits. In the first place the cabinet is usually insulated with cork, a rare "bird" in these days. The compressor is a fine piece of mechanism. The float is substantial and well made and the evaporator contains plenty of copper coil. The pressure switch is simple and on a domestic unit is set to cut-out at 10 lbs. and cut-in at 20 lbs.

A temporary by-pass connection is available in most of these old units for evacuating air; even a purge for air on top of float, if service man prefers the purging method of evacuating air. Many service men do not know what the by-pass is used for. After a system is overhauled, previous to charging, air must be evacuated and a vacuum pulled on the whole system. However, it is impossible to obtain a vacuum on a high pressure float condenser as the float is closed when no liquid is in system.

Modern high pressure float systems of 1932 and 1933 do not even furnish the convenience of a by-pass; only a purging plug.

Incorrect Charge

The system, however, is sensitive to incorrect charging.

With insufficient charge the back pressure pulls down quickly and short cycling results.

An overcharge fills up the low pressure receiver, or surge drum and a frost back occurs to compressor. Both troubles are easily observed. At least 2 lbs. of methyl is required for the old Servel System.

An excess heavy oil should not be used on a high pressure float system or the low pressure receiver; purge drum or evaporator will become oil bound.

Therefore, a service man should not lose his nerve and recommend to his customers to do away with the float and pressure switch and change over to direct-expansion thermostat control and extra expense of at least $20.00.

The complaint charts and trouble charts appearing monthly in the REFRIGERATION SERVICE ENGINEER will assist in the study of the high pressure float system which is coming back into favor.

Removing Carbon or Sulphurous Acid Deposits

PARTS that are coated with carbon or sulphurous acid deposit can be easily cleaned by soaking in apple vinegar. The higher the acidity of the vinegar, the quicker the action.—*T. J. Fowler.*

Testing for Seal Leaks by Oil Bubbles

(*a*) Run compressor suction stop valve in short.

(*b*) Pump down compressor to one pound pressure.

(*c*) Run compressor discharge stop valve in short, shutting off condenser from compressor.

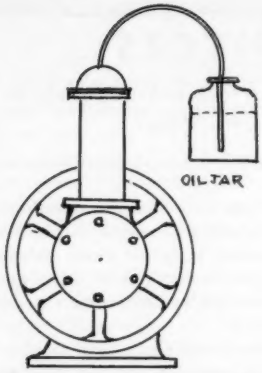
(*d*) Remove plug from discharge stop valve and allow refrigerant to blow off slowly.

(*e*) Insert half-union and connect tubing from union into a jar of clean compressor refrigeration oil.

(*f*) Start compressor and air or gas in compressor will be forced through oil.

(*g*) If seal leaks in air, or if there is any leak on suction side, bubbles will continue to flow through oil.

(*h*) If suction side is tight no bubbles appear.



HOW TO TEST FOR SEAL LEAKS

(*i*) This test must always be given before charging, while evacuating air.

(*j*) This test determines a leak but does not locate leak.

(*k*) Leak is located in system by pumping pressure on system and painting joints with soap and water.

(*l*) Leak on compressor joints is best found by air pressure and submerging compressor in water.

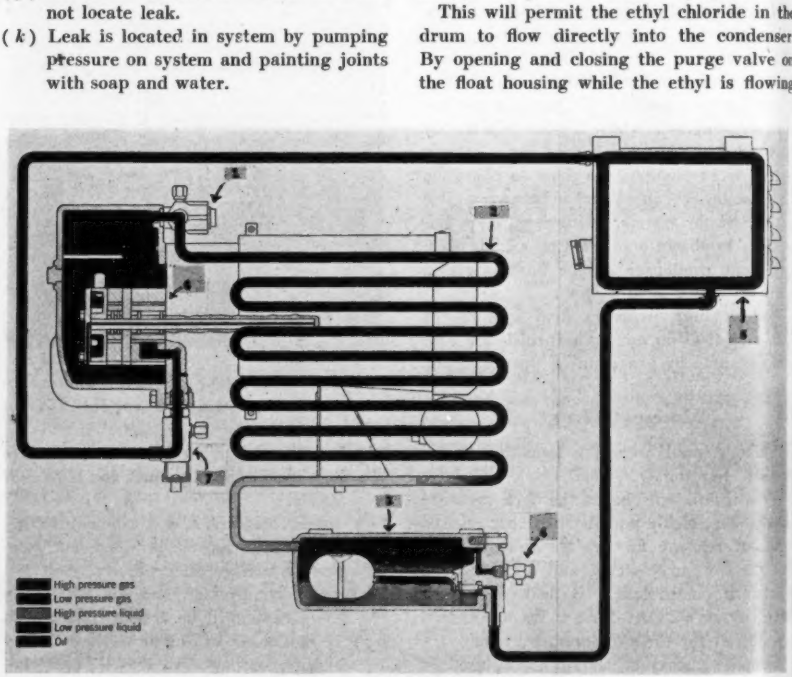
(*m*) Before stopping compressor remove tubing from oil to avoid sucking in oil in case discharge valve does not hold tight.

How to Charge the Holmes Household Machine

By H. J. DeGAN

MAKE sure the lever on Sentinel Breaker is on the "off" position. Remove blind nut from charging valve and attach a short piece of ¼ in. tubing. Connect charging drum to the tube. Remove sealing cap from charging valve. Turn valve stem to charging position. Turn drum to a position that will permit ethyl chloride liquid to flow to machine. Open valve on charging drum.

This will permit the ethyl chloride in the drum to flow directly into the condenser. By opening and closing the purge valve on the float housing while the ethyl is flowing



CYCLE OF OPERATION OF HOLMES MACHINE

1. Charging Valve. 2. Condenser. 3. Float Housing. 4. Purge Valve. 5. Chilling Unit. 6. Compressor. 7. Check Valve.

from the drum, the air in the condenser and float housing will be forced out. The liquid ethyl will flow into the float housing; permit the float ball to rise and the liquid ethyl will pass through the ⅛ in. tube to the chilling unit. If the chilling unit is warm, the ethyl will boil violently.

By opening and closing the purge valve on the chilling unit, the air that is in this unit will be allowed to escape, permitting a larger amount of liquid ethyl to enter the chilling unit. *Caution:* Do not open this purge valve except when the machine is standing idle and ethyl is being charged into system. A complete charge is from 3½ to 5½ pounds.

When the machine is fully charged, close the valve on charging drum. Turn charging valve stem to operating position. Remove the charging tube connection from valve. Connect pressure gauge to charging valve and take reading of an average room temperature of 75° which should register about 17 pounds. At no time should the pressure on the Holmes machine be more than 35 pounds.

Refrigerant Drier

THE accompanying sketch shows details of a Herkimer refrigerant drier that will stand rough usage and can be made at small cost. The male and female tongue and groove ammonia joints with gaskets will stand up for years, while a brass cased drier with threaded pipe joints will wear out after a certain number of refills.

Use 2-inch pipe for commercial work and 1¼-inch pipe for domestic work. Always keep drier capped with blind flange when not in use. Do not allow it to remain in line over two hours.

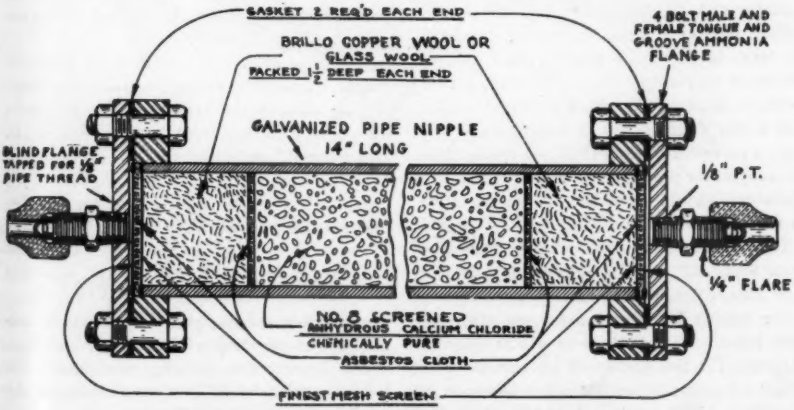
Valve Stem Packing

LEAKY valve stems are a nuisance, which of course require immediate attention. In case the service man forgets to carry valve stem packing in his kit, the tinfoil around a package of "Camels" or "Luckies" makes an excellent substitute.

KELVINATOR OIL BURNER

The Kelvinator Corporation is now producing a new type of oil burner for home heating. Present plans call for sale of the new Kelvinator oil burner through distributors in a limited number of selected key cities during this year. No effort will be made to get national distribution for the new product until a year of merchandising experience has been passed through and future merchandising policies set.

The manufacturing and sale of oil burners, which has its heaviest season from June to October, will do much to smooth out the seasonal production which accompany any exclusively refrigeration operation.


GASKET 2 REQ'D EACH END
BRILLO COPPER WOOL OR GLASS WOOL PACKED 1½ DEEP EACH END
4 BOLT MALE AND FEMALE TONGUE AND GROOVE AMMONIA FLANGE
GALVANIZED PIPE NIPPLE 14" LONG
BLIND FLANGE TAPPED FOR ⅛" PIPE THREAD
⅛" P.T.
¼" FLARE
NO. 8 SCREENED ANHYDROUS CALCIUM CHLORIDE CHEMICALLY PURE
ASBESTOS CLOTH
FINEST MESH SCREEN

CONSTRUCTION OF INEXPENSIVE REFRIGERANT DRIER

Refrigeration Required for Ice Cream Cabinets

Determining Actual Load Requirements. This Article Shows Recommended Load Allowance and Condensing Unit Size

By WM. B. RORISON

THE simple storage of ice cream in cabinets offers no problem in the selection of refrigerating equipment. The cabinets offered by most manufacturers and the method of handling the ice cream have been so thoroughly standardized that the Btu loads which should be allowed for various sized cabinets have been rather definitely established. The loads listed below have been determined from the actual operation of cabinets of usual construction under usual conditions.

The actual load is difficult to calculate because the service and leakage load of small cabinets at low temperatures is erratic. These figures are, however, made safe enough to cover probable variations in storage service.

Units of the hourly capacities indicated will operate about sixteen hours a day under usual peak conditions and have reasonable reserve capacity for emergency conditions which may be relatively more serious on this class of work than on higher temperature installations, i. e., temporary loss of power, cabinet left open accidentally, etc. Although the large brine volume gives a great deal of hold-over capacity, the low temperature tends to increase the effect of irregularities and a few degrees rise in temperature will have a more serious effect on ice cream than on many other products. For this reason, installations should be at least as conservative as referred to above.

The temperature in the cabinets should be from 5° to 12° F. Cabinets tend to hold a very steady temperature but a few degrees lower setting is desired for brick than for bulk ice cream and there is a few degrees variation for the quality of ice cream. The richer creams require somewhat lower temperatures. The customer may require a rather exact setting for serving cabinets in order that the particular grade of ice cream may be dipped easily.

Some cabinets are designed to maintain a few degrees lower temperature in the brick sleeves than in the bulk sleeves. In others an average setting must be determined. In either event, some trial may be necessary to find the best setting for the quality of ice cream. The above figures are for storage and service cabinets only.

RECOMMENDED LOAD ALLOWANCE AND CONDENSING UNIT SIZE
(STANDARD 20-QUART CANS)

	90° AIR			100° AIR		
	BTU/HR	UNIT	RPM	BTU/HR	UNIT	RPM
Single						
1 Hole	275	¼ H.P.	340	310	¼ H.P.	310
2 Hole	340	¼ H.P.	340	370	¼ H.P.*	310
3 Hole	440	¼ H.P.*	340	490	¼ H.P.*	310
4 Hole	550	¼ H.P.*	340	620	⅓ H.P.	430
5 Hole	650	⅓ H.P.	430	720	⅓ H.P.	430
6 Hole	750	⅓ H.P.	430	825	⅓ H.P.	205
8 Hole	850	⅓ H.P.	430	940	½ H.P.	280
Double						
4 Hole	470	¼ H.P.*	340	500	¼ H.P.*	340
6 Hole	620	⅓ H.P.	430	670	⅓ H.P.	430
8 Hole	730	⅓ H.P.	430	800	⅓ H.P.	205
10 Hole	860	½ H.P.	310	975	½ H.P.	280
12 Hole	1000	½ H.P.	310	1100	½ H.P.	280

*⅕ H.P. condensing units should be used if there is any probability of severe service conditions or if the condensing unit is to be installed more than 25 ft. from the cabinet.
Condensing unit size is based on using the air cooled condenser type.

WHAT SIZE FAN?

It is general fan practice to supply one hundred cubic air per minute, per one hundred pounds, ice melting equivalent (24 hours). Air should be forced through the condenser, not sucked through.

The Grunow Household Machine

The Operation of the Grunow Refrigerator Using Carrene. Essential Features of Component Parts. Determining Imperfect Operating Conditions. How to Service.

The new Grunow refrigerator is the first household machine to use the new "Carrene" (dichloromethane, CH_2 CL_2) gas for its refrigerant, which it is claimed "possesses all of the ideal features of the commonly known refrigerants."

Carrene is liquid at all normal atmospheric temperatures and pressures, and can be handled in all open containers such as bottles, cans or barrels, the same as one would handle water.

27 inches of vacuum on the suction side of the compressor, and about 8 inches of vacuum on the head side of the compressor. On another page of this issue will be found a table of the properties and characteristics of Carrene at various working pressures.

The compressor of the Grunow is of a rotary vane type, illustrated in Fig. 1 which shows the assembled unit with its driving mechanism, fan and check valve. It will be noted in Fig. 2 that there are five moving

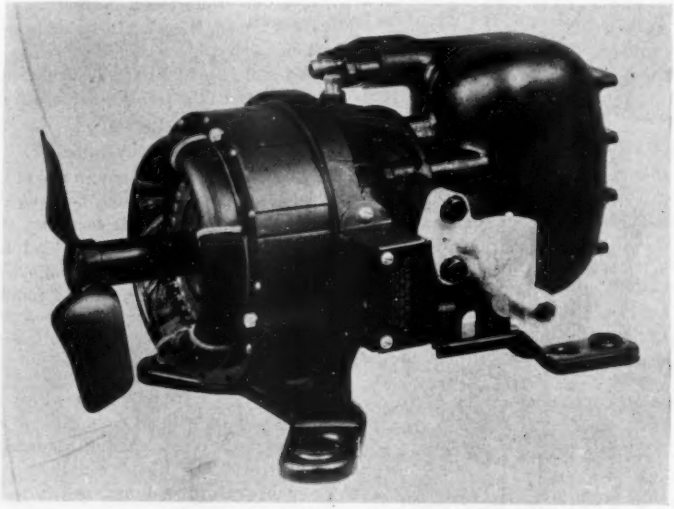


FIG. 1. ASSEMBLED UNIT. ONE SCREW REMOVES FAN

One of its most important features is its low working pressures. In a refrigerator containing Carrene, no pressures are ever encountered which exceed atmospheric pressure unless the refrigerator should be placed in a room where the temperature is 100° F. or more. In other words, if the room temperature is 80° F., the pressure inside the refrigerator will be approximately

parts, which include the four vanes of the pump rotor. The vanes and the vane slots are not radial, but are set at an angle of approximately 30 degrees to the plane which passes through the center of the rotor and the center of the vane slot at the periphery of the rotor. The angularity reduces that component part of the centrifugal force which exerts itself on the pump body. Thus,

with lower force at this point, a lesser amount of friction takes place, thereby reducing the wattage. This angle is such that when the angle between the vane and pump body is at a minimum it is still beyond the critical angle of friction. The vane when acted upon by either pressure or centrifugal force always has a tendency to push forward at its tip, thereby eliminating any action whatsoever of the vane to tip backwards in the slot and lock the pump. If oil or liquid is drawn into this compressor it will tend to compress on the exhaust side.

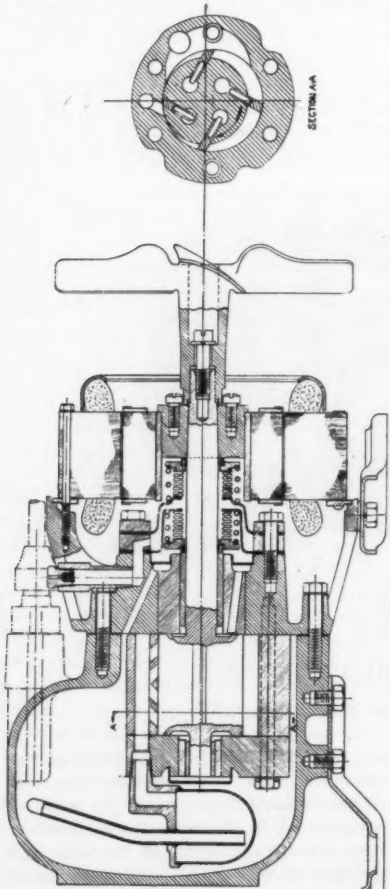


FIG. 2. DIAGRAM OF COMPRESSOR

The Oiling System

In order to produce a forced circulation of oil over the rubbing surfaces in the Grunow refrigerator, the bearings are so constructed that they act as forced pumps. The dome which covers the compressor acts as an oil reservoir, and the level of oil is above the top of the compressor proper so that the compressor is completely submerged in oil.

The Shaft Seal

The Grunow shaft seal, Fig. 3, is placed on the high pressure side of the system. The high pressure side of the Grunow in an 80° F. room operates under a vacuum of about 7 inches. When the machine is stopped, the high pressure side of the system after equalization takes place, is under a vacuum of about 15 inches. These values correspond to about 3½ and 7½ lbs. per sq. in. of negative pressure, and represent, in general, the range of differential pressures existing across the shaft seal. In order to maintain oil on the outside of the inner seal, a second shaft seal is made use of, and the compartment between the two seal faces is filled with oil at atmospheric pressure.

The Dehydrator

The Grunow system makes use of a dehydrator to take up any moisture which should get into the system while servicing, although there is no reaction of any kind between water and Carrene, or water and oil. Water, however, in the system, will, of course, produce rust.

The Float Valve

The float ball, itself, is made of heavy drawn brass constructed to withstand 250 lbs. per sq. in. without collapsing or leaking. The needle is constructed of hardened stainless steel. The liquid container is made from heavy drawn brass, and is tested for 250 lbs. per sq. in. pressure. At the top of the receiver, opposite the inlet is a purge valve. It may be opened and closed with a screw driver.

The Evaporator

The evaporator differs from the conventional evaporator in that it has the liquid line entrance along the side near the bottom rather than in the header. The liquid has a definite temperature corresponding to each pressure, and the pressure at the top of the

evaporator is lower than the pressure at the bottom of the evaporator by an amount equal to the head of liquid between top and bottom.

The Oil Return

In the Grunow household refrigerator, oil mixes perfectly with Carrene in all proportions as long as the temperature of the mixture is below the boiling point of the refrigerant. When a relatively large amount of oil is mixed with Carrene in the evaporator, no serious decrease in efficiency manifests itself. However, in order to separate the oil from the refrigerant in the evaporator, a distilling device is made use of. Since Carrene boils rather violently, it is susceptible to a considerable amount of splashing, and some of the liquid splashes to the upper end of the inclined plane and runs down the inclined plane over a zigzag path. This inclined plane is made of copper, which is a good heat conductor, and it is placed in the upper part of the evaporator header where the temperature is highest. As the mixture runs down the inclined plane, the Carrene evaporates from the oil and nothing but oil reaches its lower end. A hole is provided through the copper sheet at this point, which permits the oil to drop directly into the suction line, and from there, it returns direct to the compressor.

The Check Valve

The check valve, Fig. 4, is, of course, for the purpose of maintaining low pressure in the evaporator when the machine is on the off part of the cycle. Since a drop of pressure on any part of the low side of the system means a loss of efficiency this valve is constructed to reduce this loss to a minimum. The component part of the check valve is a thin wafer of hard stainless steel about the size of a nickel resting on a hardened stainless steel seat. No spring is used to seat this valve.

The Suction and Liquid Lines

The suction line of the Grunow Refrigerator is a $\frac{5}{8}$ inch diameter copper tube. In order to prevent as much as possible a superheated condition of the gas as it flows from the cold evaporator to the warm compressor, the suction line is insulated. The liquid line consists of one continuous length of $\frac{3}{16}$ inch tubing. At the top of the liquid line is a loop which extends higher than the level of the liquid in the evaporator, preventing drops of the liquid from flowing down the liquid line, to the float valve, where it would boil and return to the evaporator in the form of gas. Due to the snap action of the valve and the loop at the upper end of the liquid line, the liquid line contains no liquid at any time, whether on the running or the off part of the cycle, except a short interval immediately following each pulse of the float valve.

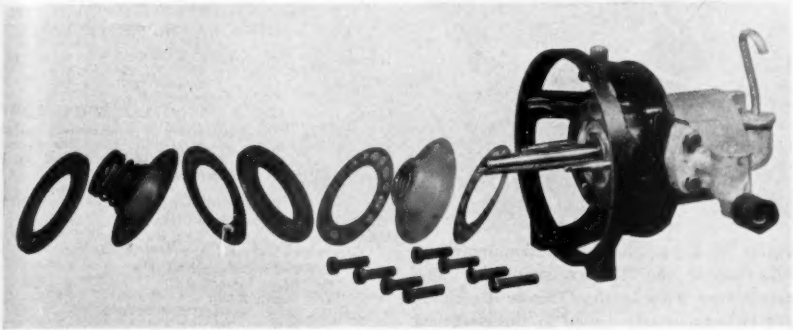
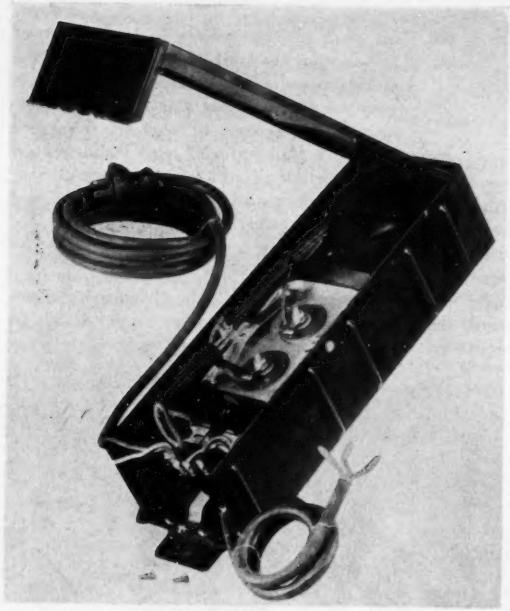


FIG. 3. THE SHAFT SEAL

The Motor and Electrical Unit

The motor is a high starting torque capacitor type induction motor, and although running on single phase line current, it operates



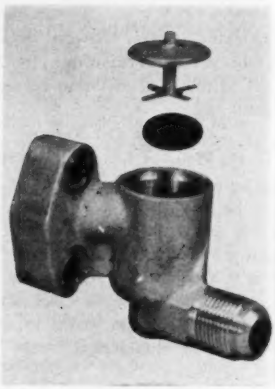


FIG. 4. THE CHECK VALVE

FIG. 5. THE ELECTRICAL UNIT
The transformer is permanently sealed in the electrical unit box. The capacitor is also permanently sealed in a separate metal container.

similar to a polyphase induction motor in both running and starting conditions. The transformer used in the Grunow Refrigerator is permanently sealed in the electrical unit box. The capacitor is permanently sealed in a separate metal container which is clamped into this same electrical unit. The relay is also mounted there on springs for the elimination of noise during starting, and has terminals on it for easy removal of the cord to the thermal control in case the unit, Fig. 5, must be removed from the refrigerator.

Motor Protector

The Grunow unit contains a motor protector to assure that the refrigerator equipment is not injured in any way if the unit is connected wrong, or if the line voltage becomes too high, or too low.

Servicing the Grunow Refrigerator

An imperfect operating machine is the result of some imperfection or improper setting of the mechanism. It is always evidenced by one or more of the symptoms disclosed in the following table. After each symptom is listed possible sources of the difficulty.

(1) Overload Cutout Trips Repeatedly
- (a) Detective overload trip
- (b) Short in motor
- (c) Pump stuck
- (d) Poor electrical connections
- (e) Low voltage
- (f) Air in the system
- (g) Too much refrigerant
- (h) Condenser covered with dirt
- (i) No circulation of air through the condenser
- (j) Open or shorted electrical condenser
- (k) Defective transformer
- (l) Relay stuck in up position or the contacts are dirty.
- (m) Operating on frequency other than specified on name plate
- (n) Operating on D. C.

(2) Refrigerator operates on short off cycle
- (a) Defective thermostat
- (b) Leaking check valve
- (c) Leaking float valve
- (d) Thermal contact between cold control bulb and evaporator too intimate

(3) Noisy Unit
- (a) Squeaking shaft seal
- (b) Pipes rattling against other parts of unit
- (c) Foreign material attached to fan
- (d) Starting relay defective
- (e) Mounting lugs touching bolts
- (f) Suction tube vibrating
- (g) Shipping blocks not removed

(4) Unit operating too long
- (a) Cold control bulb loose in clamp
- (b) Cold control set to cold.
- (c) Leaky float valve
- (d) Insufficient refrigerant in evaporator
- (e) Float valve clogged with dirt or stuck closed
- (f) Leaky float ball

(g) Plugged liquid line
(h) Condenser coated with dirt
(i) Air in the system
(j) Too near heating system
(k) Refrigerator exposed to sun rays
(l) Defective gaskets around door
(m) Worn hinges or latch
(n) Hot food in refrigerator
(o) Defective thermo switch
(p) Overcharge of carrene
(q) Defective pump
(r) Insufficient oil in dome
(s) Evaporator or coated with frost

(5) Unit operates continuously
(a) All items included in Symptom No. 4 plus
(b) Liquid line frozen
(c) Float stuck open
(d) Shorted thermostatic circuit

(6) Unit does not operate
(a) Refrigerator location too cold
(b) Overload cutout tripped
(c) Defective cold control
(d) Power supply cut off
(e) Fuse blown out
(f) Defective electrical connections
(g) Starting relay defective
(h) Defective motor
(i) Stuck pump
(j) Burned out heater in overload trip
(k) Low line voltage
(l) High head pressure
(m) Stuck relay
(n) Frequency of electrical supply wrong
(o) Power Supply D. C. instead of A. C.
(p) Defective Condenser

(7) Freezes ice with comparatively warm food compartment
(a) Evaporator heavily frosted
(b) No circulation of air around evaporator

(8) Food compartment cold but unit will not freeze desserts
(a) Too much alcohol, acid or sugar in desserts
(b) Location of thermostat bulb and setting of cold control wrong
(c) Refrigerator location too cold

(9) Evaporator defrosts
(a) Shortage of refrigerant
(b) Thermal contact of cold control bulb to evaporator incorrect
(c) Poor setting of cold control
(d) Overload cutout tripped
(e) Fuse blown
(f) Defective wiring
(g) Power supply cut off
(h) Float valve leak
(i) Float valve plugged
(j) Liquid line plugged
(k) Liquid line frozen
(l) Air in system

Air in the System

There is only one way in which air can get into the system, and that is through a leak. If the symptom indicates that air might be in the system, a test for a leak should be made before anything else is done. The usual method of a detector torch is used. In order to locate a leak on the Grunow Refrigerator, the following procedure should be strictly adhered to:

1. Remove the outer cap from purge valve.
2. Attach the Purging Tool which is equipped with the gauge.
3. Remove the purge valve core of the Purging Tool.
4. Connect an automobile tire pump to the Purging Tool where the purge valve core was removed.
5. By means of the screw-driver attached to the Purging Tool, open the inner purge valve.
6. With the automobile tire pump, force air into the system until gauge reads approximately fifteen (15) pounds.
7. Close inner purge valve and remove tire pump, being sure that there is still about fifteen (15) pounds of pressure left in the float valve.
8. Replace outer purge core in purge tool and tighten.
9. Place heater in lower compartment of evaporator and heat evaporator up to about 145° F. The represents a temperature about as hot as the hand can stand. Remove heater plug but leave heater in evaporator.
10. Recheck pressure in float valve by loosening slightly the inner purge valve. If this pressure is still more than ten (10) pounds and less than twenty (20) pounds, the system is now ready for the leak test.
11. Use the open end of rubber tube on the Halide Torch and go over the following places looking for leaks as indicated by a green flame:
    (a) Evaporator suction line connection at evaporator
    (b) Evaporator liquid line connection at evaporator
    (c) Liquid line for its entire length inside of food liner
    (d) Check evaporator for leaks by several passes over each side of the evaporator and evaporator header ends
    (e) Liquid line connection from bottom of float valve.
    (f) Liquid line connection at top of float valve
    (g) Check valve connection (5/8")
    (h) Check valve gasket
    (i) Dome outlet connection
    (j) Dome outlet gasket
    (k) Around all soldered joints
    (l) Dome gasket
    (m) Shaft seal gaskets

    Before putting an O.K. on any connection, be absolutely sure there is not even the smallest leak.
12. If there are no leaks present, the inner and outer purge valves are to be opened, allowing the air to escape. The system is now ready for the regular purging procedure. (If a leak is encountered, the pressure is to be brought back to zero and the leak eliminated and the above operations repeated.)

Purging the Machine

1. Plug in the compressor for a series of short intervals so that the head pressure does not exceed more than five (5) pounds. As soon as the pressure drops to zero the outer purge valve is to be closed.
2. Plug in heater in evaporator and allow to heat during the time the system is being finally purged of all air. Experience will tell when to take heater out in order not to overheat an evaporator, or a thermometer may be used. (Max. temp. 150° F.)
3. Cover up condenser, compressor dome and float valve with felt blankets immediately after the heater is turned on as indicated in Operation 2.
4. When the pressure reaches any point between three (3) and six (6) pounds, the outer purge valve is loosened, allowing the air to escape for about five to ten seconds. Make two more such purges at intervals of about one minute. At the end of the third and last purge, close inner and outer purge valves tightly.

5. Immediately remove all felt blankets and if the heater in the evaporator has not already been turned off and removed it should be done at this time.
6. Thermostat is set to the extreme right hand position and the door is closed tightly for the pull down.
7. After ten to fifteen minutes running, the inner purge valve should be loosened slightly a couple of times successively to see that the vacuum is gradually increasing.
8. If the vacuum is gradually increasing, it is a preliminary indication that the system probably has no leaks. However, if there is no general upward trend in vacuum it means probably a leaky system on the procedure for leak testing will have to be repeated.

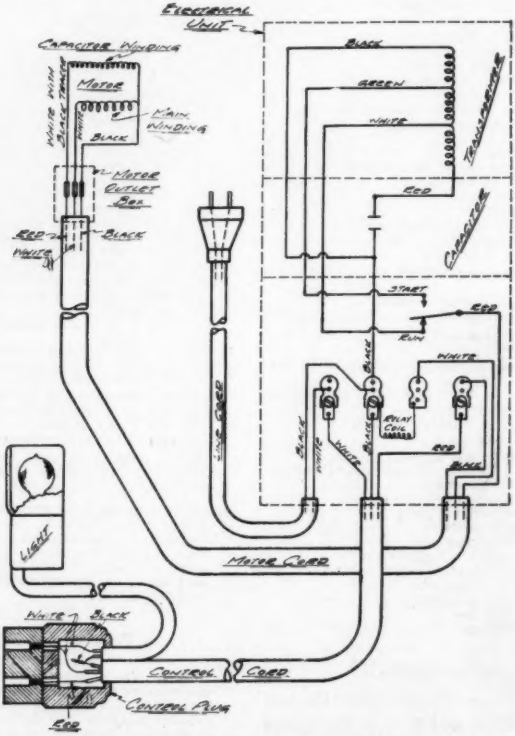


FIG. 6. WIRING DIAGRAM OF GRUNOW REFRIGERATOR

Checking the Charge of Carrene

If the leak has occurred on the suction side of the machine, no refrigerant will normally be lost unless the leak is below the level of the liquid in the evaporator, but if it occurs on the head side of the machine, some refrigerant may have escaped before the leak was detected. If the symptoms indicate that an improper charge of refrigerant is in the system, it may be checked in the following manner:

1. Be sure that several inches of vacuum exists on the head side of the machine.
2. Stop the machine after a five hour or longer run.
3. Open the suction line by loosening the flare nut, at the check valve.
4. Allow about ten minutes for the air pressure which has entered the evaporator to force the liquid from the evaporator into the flow chamber.
5. Remove the purge valve core from the flow chamber.
6. Insert a 3/16 inch copper tube, which has a funnel soldered to its end and pour in Carrene until the float valve overflows. Do not put 3/16 inch tubing into float valve

too far, as there is danger of damaging the inlet screen.

7. Tighten the flare nut on the suction line at the check valve.
8. Start the machine and immediately stop it again. Do this several times until air no longer escapes from the purge valve. Then, permit the machine to run continuously.
9. Purge the machine in accordance with the procedure already outlined for purging.

The Cold Control Settings

Altitude affects the setting of the cold control. The cold controls are all set at the factory at position No. 1 to give cabinet temperature of between 41° and 44° F. when the room temperature is 80° F. The greater the altitude, the lower the barometer reading, and the lower the barometer, the lower the refrigerator temperature. A change of one inch in barometer reading will shift the thermostat bulb temperature about 1¼ degrees at the on and off positions. To correct the thermostat for barometer variations, the metal cap on the end of the cold control should be removed, and the screw underneath loosened. This permits the changing of the knob on the shaft. Shifting the knob clockwise on the shaft raises the box temperature, and shifting it counter-clockwise lowers the temperature. After the knob has been set in its new position, the screw should be tightened and the small escutcheon replaced. It may be necessary at some time to re-set the cold control for other reasons. For example—the machine may operate with a defrosting cycle when in an 80° F. room, and the cold control set at position No. 1. This may be caused by a poor contact between the thermostat bulb and the clamp which holds it to the evaporator. The more intimate the contact between the thermostat bulb and the evaporator itself, the shorter cycle and the higher the box temperature will be. In order to cure a defrosting cycle with a cold control, set at position No. 1, all that is necessary is to produce a more intimate contact between the thermostat bulb and the evaporator, and at the same time, re-set the cold control knob to a position which is counter-clockwise with respect to its former setting.

REFRIGERATION SERVICE IN A NUT SHELL

By HERBERT HERKIMER

A detective has two lines of procedure,

(A) Having a clue, he trails the criminal.

(B) Having no clue, he searches for a clue.

The service engineer is in the same predicament, he has two lines of procedure,

(A) Complaints of customer, who gives the specific clue.

(B) Trouble shooting, no specific clue being given.

The duty of a service engineer is,

1. To discover the cause of specific *complaint.*
2. Or to discover the complaint which we will call trouble shooting.
3. To repair the system in the most practical and economical manner.

One Complaint Chart will appear in eight successive monthly editions of the REFRIGERATION SERVICE ENGINEER. The first chart appeared in the June issue on page 34. Complaint Chart No. 2 appears on following page.

However, a situation arises at times in which no specific complaint has been made. Something is wrong, but no clue has been given. It may be safely assumed that a used refrigerator needs an adjusting or overhauling which comes in this classification, which we will call *trouble shooting:* looking for trouble even though it may not be there. The writer has organized another chart, which we will call the Trouble Chart, which lays down a rule of procedure in this situation.

The eight Complaint Charts combined with the use of the Trouble Chart which appeared in the June issue bound in a loose leaf pocket folder has proven of assistance to the most experienced service engineers. The complete set of eight Complaint Charts in conjunction with the Trouble Chart will assist in the diagnosing of most service complaints. The writer will be pleased to answer all questions if mailed to the Secretary, Refrigeration Service Engineers' Society, 438 N. Waller Avenue, Chicago, Ill.

COMPLAINT CHART NO. 2

C=CAPILLARY TUBE
LF=LOW SIDE FLOAT
HF=HIGH SIDE FLOAT
DA=AUTOMATIC EXPANSION VALVE
DT=THERMOSTATIC EXPANSION VALVE
T=THERMOSTAT CONTROL
P=PRESSURE CONTROL

CAUSES OF COMPLAINT	SYSTEMS						
	LF		HF		C	DA	DT
	T	P	T	P	T	T	P
COMPLAINT NO. 2—LONG ON CYCLE BUT REFRIGERATOR TEMPERATURE SATISFACTORY							
(a) Slight undercharge of refrigerant	√	√	√	..	√	√	√
(b) Slight overcharge of refrigerant	√	√	..	..	√	√	√
(c) Small leak in float valve	√	√	..	..	..	..	..
(d) Wrong float adjustment	√	..	..	..	..	..	..
(e) Inefficient compressor	√	√	√	√	√	√	√
(f) Thermostat switch cuts out low	√	..	√	..	√	√	..
(g) Pressure switch cuts out too low	..	√	..	√	..	..	√
(h) Pitted switch contacts, defective control	√	√	√	√	√	√	√
(i) Loose thermostat bulb clamp	√	..	√	..	√	√	√
(j) Air in system	√	√	√	√	√	√	√
(k) Refrigerator in place too hot, poor fitting door	√	√	√	√	√	√	√
(l) Belt slipping, motor too slow, key slipping	√	√	√	√	√	√	√
(m) Low voltage to motor	√	√	√	√	√	√	√
(n) Motor brushes reset, dirty commutator	√	√	√	√	√	√	√
(o) Motor governor broken or armature short circuited	√	√	√	√	√	√	√
(p) Slightly stuck open expansion valve	..	..	..	..	..	√	√
(q) Capillary tube opening slightly oversized	..	..	..	..	√	..	..

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(2)

Cut out along outer line and insert in binder for ready reference.

FOR LEATHER BINDER WRITE TO H. T. McDERMOTT, SECRETARY REFRIGERATION SERVICE ENGINEERS' SOCIETY, 433 N. WALLER AVE., CHICAGO, ILL.

Properties and Characteristics of Carrene

Temp. F°	Absolute Pressure #/Sq. In.	Absolute Pressure " Mercury	*Gauge Readings	Cubic Ft. / Lb.	Latent Heat	Heat of Liquid
–10	.699	1.42	28.08"	81.30	165.16	–3.40
– 5	.882	1.69	27.81"	68.33	164.21	–1.70
0	.995	2.02	27.48"	58.65	163.16	.00
5	1.177	2.39	27.11"	49.9	162.1	1.70
10	1.384	2.81	26.69"	42.55	161.00	3.40
15	1.63	3.31	26.19"	36.50	159.9	5.10
20	1.92	3.90	25.60"	31.40	158.8	6.80
25	2.22	4.52	24.98"	27.20	157.75	8.59
30	2.58	5.23	24.27"	23.90	156.69	10.20
35	2.965	6.02	23.48"	21.10	155.59	11.90
40	3.38	6.87	22.63"	18.60	154.39	13.60
45	3.835	7.78	21.72"	16.50	153.24	15.30
50	4.35	8.83	20.67"	14.68	152.04	17.00
55	4.92	10.01	19.49"	13.10	150.89	18.70
60	5.57	11.31	18.19"	11.68	149.71	20.40
65	6.3	12.78	16.72"	10.40	148.47	22.10
70	7.1	14.41	15.09"	9.38	147.20	23.80
75	7.92	16.07	13.43"	8.40	146.10	25.50
80	8.85	17.96	11.54"	7.50	144.82	27.20
85	9.88	20.06	8.44"	6.80	143.54	28.90
90	10.92	22.18	7.32"	6.20	142.26	30.60
95	12.04	24.48	5.02"	5.63	140.97	32.30
100	13.35	27.10	2.40"	5.14	139.65	34.00
105	14.7	29.89	.19#	4.74	138.30	35.70
110	16.16	32.80	1.62#	4.31	136.98	37.40
115	17.66	35.84	3.12#	3.95	135.53	39.10
120	19.28	39.16	4.75#	3.65	134.20	40.80
125	21.1	42.82	6.56#	3.35	132.80	42.50
130	22.9	46.52	8.38#	3.10	131.30	44.20
135	24.9	50.60	10.4 #	2.88	129.90	45.90
140	26.9	54.60	12.4 #	2.69	128.40	47.60

* Inches of vacuum if below atmosphere—pounds per square inch if above atmosphere—Barometer 29.5".

Chemical Formula	$C H_2Cl_2$
Molecular Weight	84.9
Gas Constant (R)	20.2
Specific Gravity of Liquid (60° F.)	1.33
Specific Heat of Liquid (68° F.)	.34
Boiling Point at Atmospheric Pressure	105° F.
Density of Vapor (Compared with Air)	3.0
Theoretical Specific Weight of Vapor	2.91
Specific Heat at Constant Pressure (C_p)	.154
Specific Heat at Constant Volume (C_v)	.128
Ratio of Specific Heats (C_p/C_v)	1.2
Critical Temperature	421° F.
Freezing (Triple) Point	–142° F.

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FOR LEATHER BINDER WRITE TO H. T. McDERMOTT, SECRETARY REFRIGERATION SERVICE ENGINEERS' SOCIETY, 433 N. WALLER AVE., CHICAGO, ILL.

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FOR LEATHER BINDER WRITE TO H. T. McDERMOTT, SECRETARY REFRIGERATION SERVICE ENGINEERS' SOCIETY, 433 N. WALLER AVE., CHICAGO, ILL.

The REFRIGERATION SERVICE ENGINEER

A Monthly Illustrated Journal, Devoted to the Interests of the Engineer Servicing Refrigeration Units, Oil Burners and other Household Equipment.

Vol. 1 JULY, 1933 No. 2

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Official Organ
REFRIGERATION SERVICE ENGINEERS' SOCIETY

WE THANK YOU—

THE publishers of THE REFRIGERATION SERVICE ENGINEER acknowledge the many commendatory letters received on the publication of its first issue. The response to the publication of this new magazine has been most gratifying.

The many letters received by the publishers is an indication that THE REFRIGERATION SERVICE ENGINEER will fill a definite need to the rapidly expanding field of men engaged in refrigeration and oil burner servicing work. We regret that lack of space prevents the publication of all the many letters.

Norge Nestor Co., Inc.,
Florida.

"We have received a copy of the first issue of your new magazine, THE REFRIGERATION SERVICE ENGINEER, and find it very interesting. We believe that many of the service men of our dealers would be interested in subscribing to this publication, and we will be glad to supply you with a selected list of about twenty-five or thirty names, to whom you could send a sample copy of your magazine."—Allen H. Crook, Secretary.

Peter Thomas Ferres,
Pennsylvania.

"A friend of mine has given me a card to subscribe for your wonderful magazine, which I have mailed. I want to give you a list of names of my friends, who I know will appreciate your new journal."

R. W. Neislar,
Arkansas.

"I am enclosing money order for subscription to THE REFRIGERATION SERVICE ENGINEER. I am very much elated over the new publication. I am familiar with your company and appreciate the service that it has rendered in the refrigerating field. I feel confident that this new publication will meet a need in the small commercial and domestic industry. I am looking forward with much interest to the future publications, and intend to retain a file so that I can use them for reference."

Alco Valve Co.,
Missouri.

"You are to be commended on bringing out a trade paper of this kind, as there is a great need for it. We believe this journal will soon have a very large circulation, and if you confine your efforts to the purpose for which it is intended, you will be rendering a great service to the refrigeration trade."—J. L. Shrode, President.

Ansul Chemical Co.,
Wisconsin.

"It seems to us that you got away to a fine start on your first issue. From our point of view, it would seem that you have included just the type of information they need in it."—H. B. Higley, Secretary.

Bush Mfg. Co.,
Connecticut.

"I feel that I can fairly compliment you on the first issue of THE REFRIGERATION SERVICE ENGINEER."—C. T. Bappler.

Merchant & Evans Co.,
Pennsylvania.

"We think this magazine is a very good one and has a very definite place in the field. We enclose, herewith, our application for subscription, and have also requested our advertising agency to forward you an order."—H. A. Adams, Refrigeration Department.

Trenton Auto Radiator Works,
New Jersey.

"I think your initial issue is commendable. We have already received a number of inquiries directly traceable to your paper. I appreciate the fact that the quality of your work, as well as the circulation, is directly dependent upon the cooperation you receive from your advertisers. I sincerely hope they will fall in line, for in my opinion your publication can fill a vacant spot in a very big industry, and it will be of very definite advantage to every one who participates."—R. E. Nitzsche.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation of domestic and small commercial equipment; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

ASSOCIATION HEADQUARTERS: 433-435 North Waller Ave., CHICAGO, ILL.

The Purpose of the Society

RECOGNIZING the value of associated educational effort in the advancement of any profession, the REFRIGERATION SERVICE ENGINEERS' SOCIETY, composed of service men identified in the servicing of domestic and small commercial refrigerating machinery and oil burners was organized principally to further the educational standard of its membership, to assist in the stabilization of the business, and to encourage the adoption of ethical standards of practice.

JOIN THE R. S. E. S.

In a city where a local chapter is organized, a member affiliated with the REFRIGERATION SERVICE ENGINEERS' SOCIETY through the local chapter, and if no local chapter is convenient to a member's residence, he joins the Society as a member-at-large.

JOIN THE R. S. E. S.

All members of the Society, whether affiliated with a local chapter or as a member-at-large, secure the benefits of the Society's educational activities through the receipt of educational material prepared by the National Educational and Examining Board, as well as all Bulletins and other literature that may be issued from time to time. Likewise, the Society "Question Box" is open to all members.

JOIN THE R. S. E. S.

Application for membership in the Society must be made on blank forms provided for that purpose, which will be referred to the Membership Committee, upon whose approval the application will then be referred to the Educational and Examining Board, which shall determine if the applicant meets the requirements of any class of membership provided for, either active or associate.

JOIN THE R. S. E. S.

The By-Laws of the Society provide that the regular initiation fee for all members shall be $5.00, with annual dues of $7.50 per annum; however, for the year of 1933, the Board of Directors have waived the initiation fee and fixed the dues for the balance of the year at $5.00. Therefore, all applications accompanied by a remittance of $5.00 will pay in full the initiation fee and dues for the current year, including subscription to the official organ—THE REFRIGERATION SERVICE ENGINEER.

JOIN THE R. S. E. S.

If you are identified with refrigeration servicing, you should be a member of the Society. It represents your interests. Write for application blank to H. T. McDermott, National Secretary, 435 N. Waller Ave., Chicago, Ill.

GREETINGS TO THE R.S.E.S.

THE following letter, received from Mr. Milton Boneberg, Buffalo, N. Y., will be of interest to the members of the R. S. E. S. and prospective members.

Some three years ago, Mr. Boneberg endeavored to form the National Society of Refrigeration Service Engineers, but as explained in his letter, unforeseen conditions at that time prevented continuation of the work.

Greetings to the Officers and Members of the Refrigeration Service Engineers' Society

As the Past National President of the National Society of Refrigeration Engineers, I want to extend to your organization my congratulations and best wishes for success.

There is little doubt in the minds of the better service men that an organization is needed in our industry. We of the National Society of Service Engineers tried to do a real job but before we got well under way, we ran into some snags which we were unable to cope with and had to drop out of the race.

The Refrigeration Service Engineers Society has a real place to fill and I know it will fill this need. You who are members and all service men who plan to join this organization know that only by banding ourselves together can we expect to gain the recognition that our industry really owes us all.

By organizing together, we can produce better service data, better educational bulletins, and what is needed more than anything else in the industry a set of standards which will set the qualifications of the service man.

To those who are now heading this new organization, I can only say that it depends on your efforts and I know only too well how much you will have to put in, to put this good work over. But there is satisfaction for all your efforts when you see the results from your work, as I have had the opportunity to see.

To the membership, I can only say that to produce results you, too, must lend a hand to the officers of your society and the local chapter. It is only by getting up at meetings and putting over your ideas that the Society can help you.

And lastly to those who are not now members of this organization, if you consider yourself a refrigeration service man your place is the Refrigeration Service Engineers Society. You are helping yourself and also helping your fellow service men by being a member.

Yours very truly,
MILTON BONEBERG.

MEETINGS OF CHAPTERS

New York Chapter No. 1

Meeting of May 25

AFTER the usual business of the meeting was disposed of, Mr. A. B. Schellenberg, of the Alco Valve Co., delivered a lecture on "The Use of Automatic Controls in Refrigeration." Mr. Schellenberg's talk was illustrated with the use of a motion picture camera, which graphically illustrated the action of various control valves commonly used in refrigeration work.

At the conclusion of Mr. Schellenberg's talk, Mr. F. H. Brauninger, service manager of Stewart Warner Co., addressed the members on the importance of the independent service man being thoroughly trained in his work. The independent service man is in a position, he advised, to make a real business for himself and secure local prestige, if he is qualified to do his servicing work in a businesslike and efficient manner.

As the worker is "worthy of his hire" he can secure the true value for his services when he is in a position to do a satisfactory job, and Mr. Brauninger also stated that there were manufacturers of refrigerators who were willing to see that the servicing business is done by the independent operator, if he is qualified to do so. He stressed particular importance on maintaining ethical standards of practice and being square with the customer. Giving one customer a lower price than another soon travels by the "grapevine" system, and irrespective of the distance, the fact that cut-rate prices are being given will soon be found out.

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Meeting of June 8

The speakers of the meeting were Mr. O. C. Etterwendt and Mr. Fred H. Kossatz, of the C. J. Tagliabue Manufacturing Co. Mr. Etterwendt described the Tag Automatic Temperature and Pressure Controllers, with the aid of illustrated charts.

Following his talk, Mr. Kossatz, who is one of the Tag trouble shooters, went into more details on the controls, and also answered questions regarding their servicing. Among the instruments shown was the Tag Miniature-Sized Recording Thermometer, combining two recorders, one recording the running and idling time of the motor, and the other charting a continuous, accurate record of the temperature.

Still another instrument was the Tag Square-Case Dial-Indicating Thermometer, which gives a quick, accurate indication of the temperature in either the food compartment or cooling unit. This instrument permits the service man to make all field adjustments without resorting to the usual methods of checking up in a customer's home.

Northern New Jersey Chapter No. 1

Meeting of May 24

Plans were discussed by the Educational Committee in reference to the progress to be made in arrangements for their future meetings. A general discussion by the members on Beer Cooling followed.

Meeting of June 7

After the usual business of the meeting was disposed of, the secretary was author-

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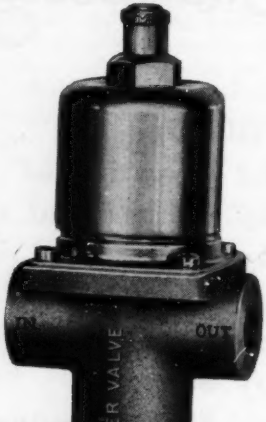

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ized to make arrangements for a speaker on Beer Cooling, to be delivered at an early meeting. A general discussion took place on various conditions and experiences that the service man encounters.

Greater Chicago Chapter No. 1

Meeting of June 13

At this meeting, President T. J. Fowler announced the appointment of Mr. Paul Jacobsen and Mr. H. W. Wishart as members of the Educational Committee.

Mr. C. E. Hamilton, chairman of the Educational Committee, introduced Mr. H. B. McLaughlin, representative of the Liquid Cooler Co., Detroit, Mich., who explained at length the operation and installation of the Temprite Beer Cooler.

Following this talk, Mr. W. S. Bodinus, of the Carrier Corp., addressed the members on the "Properties and Characteristics of the New Carrene Gas."

Meeting of June 27

After President T. J. Fowler disposed of the business of the meeting, Mr. D. B. Wile, of the Detroit Lubricator Co., gave an extended address on the "Automatic Expansion Valve." He illustrated his talk by the use of the blackboard and demonstrated to the members the various methods in which the automatic expansion valve could be used to secure the best results.

The Question Box was opened and the following questions were asked: "How to Charge a Holmes Refrigerator"—which was answered by Mr. H. J. DeGan. "What Is Meant by the Latent Heat of Fusion"—which was answered by Mr. C. E. Hamilton.

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S S S

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Refrigeration Service Technician's Course, including instruction on Methyl Chloride, Sulphur Dioxide and F-12. Five weeks' duration. Day school sessions are from 9:15 a. m. until 12:00 from Monday to Friday, inclusive. Night school sessions are from 7:15 to 9:45. The tuition is $50.00, or on the deferred payment plan, $10.00 on enrollment and $10.00 per week for five weeks.

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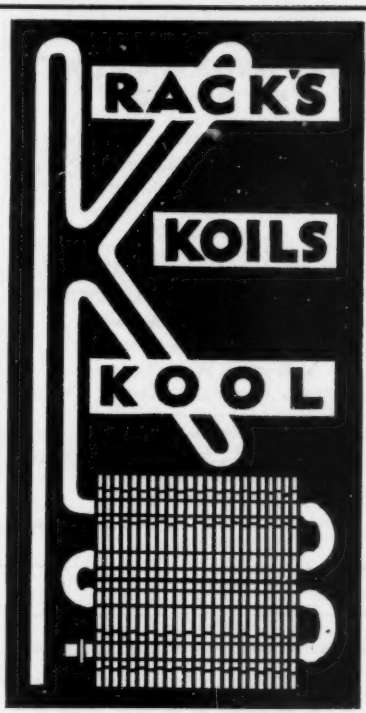

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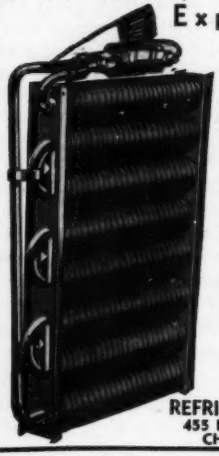

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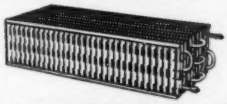

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AUSTIN 6343

ANSUL SULPHUR DIOXIDE

The CHOICE of Those Who Demand the Best

A number of large manufacturers have commissioned us to supply the sulphur dioxide requirements of all their distributors. High quality of product in individually analyzed cylinders, nation-wide distribution from over 40 warehouse stocks gave us this business. The same factors have influenced service men everywhere to standardize on Ansul Sulphur dioxide. Write for quotation and location of nearest warehouse stock.

Absolute Uniformity

ANSUL CHEMICAL COMPANY
MARINETTE, WIS.

Check Your Next Service Job with
A TURNER HALIDE DETECTOR

It will positively detect leakage of any Chlorinated Hydrocarbon Refrigerant including Artic, Methyl Chloride, Ethyl Chloride, F-12, F-114, Freon, Carrene, Methylene Chloride, Trichlore-ethylene, and Dichlorodifluoromethane.

The TURNER Halide Detector is carried and used by thousands of service men. It is indispensable for making field tests as it is extremely sensitive and will detect minute leaks and yet is very easily handled and operated. Order a test sample now and save time and expense.

WRITE FOR CATALOG "C" AND PRICES

THE TURNER BRASS WORKS, Sycamore, Illinois

MERCOID

AUTOMATIC CONTROL
FOR REFRIGERATION EQUIPMENT

Mercoid Controls are built up to a high standard of accurate and dependable performance. All switches in Mercoid Controls are of the sealed mercury enclosed type. There can be no open arcing, pitting or corrosion.

The best in automatic controls invariably proves the most economical. They eliminate unnecessary service expense. Use a Mercoid on your next job.

Complete Catalog No. R-4 sent upon request

FIGURE 61 HIGH PRESSURE CUT-OUT FOR AMMONIA AND CO^2

Mercoid High Pressure Safety Cut-out Controls are well known for their dependable service under the most exacting requirements in the field.

Figure 61 has a heavy steel Bourdon tubing, which is Udylite-plated to prevent corrosion and constructed for accurate and enduring performance. The "Snap-action" movement locks the switch in position at both the cut-in and cut-out points. All mechanism parts are of nickel silver or are nickel-plated.

Furnished in 5¼" plain steel case, with ¼" drop-forged male bottom connection and approved electrical outlet box, where it is desired to connect this control directly to compressor or high pressure lines.

Fig. 61

For panel mounting, this control is furnished with 5¼" flanged case, with ¼" male back connection, and either with or without outlet box.

Where used with ammonia, they are usually furnished semi-automatic to cut out at 225 lbs. pressure, requiring hand reset, to restart the compressor, as many states require this feature.

An adjustment is provided on the back of the case so that the cut-out point can easily be changed for any operating pressure between 100 and 300 lbs. For fully automatic service the differential is 75 lbs.

When furnished for CO^2, this control is set to cut out at 1250 lbs. When fully automatic a differential of 500 lbs. or more is required.

MERCOID AMMONIA GAUGES FOR LOW PRESSURE AND HIGH PRESSURE

Mercoid Ammonia Gauges insure accurate performance, long life and protection against deterioration.

They are made in 5¼" size. In design and general appearance they correspond with the Mercoid Ammonia High Pressure Cut-out. The steel Bourdon tubes in these gauges are the same as in the Ammonia Safety Cut-out. They are greater in area and heavier than ordinarily used. The movements and dials are mounted on the bottom piece, obviating the danger of distortion during installation. The movements are made of monel metal, wholly non-corrosive. The white dial is not affected by ammonia fumes. Furnished also with bottom connection where required.

Low Pressure—Fig. 60

High Pressure—Fig. 59

Write for complete Gauge Catalog No. G-5